T06D03 – (6.2a) Kinetic Theory Notes

Name …….

1. 6.2.1 Describe the kinetic theory in terms of the movement of particles whose average energy is proportional to temperature in kelvins. (2)
    a. What assumptions are made for the Kinetic Theory?
        i.
        ii.
        iii.
        iv.
        v.
        vi.
        vii.
        viii.

2. 6.2.2 Define the term activation energy, Ea. (1)
    a. What is activation energy? Provide a diagram for the activation energy in both an endothermic and exothermic reaction:

Diagram of Endothermic Reaction (focus on Ea)	Diagram of Exothermic Reaction (focus on Ea)

3. 6.2.3 Describe the collision theory. (2)
    a. What requirements must be set in order for a reaction to occur (based on the collision theory)?
        i.
        ii.
        iii.

4. 6.2.4 Predict and explain, using the collision theory, the qualitative effects of particle size, temperature, concentration and pressure on the rate of a reaction. (3)
    a. Explain how each of the following factors affect the reaction rate:

Factor	Explanation of the effect on reaction rate
Concentration	
Pressure	
Temperature	
Particle Size	
Light	

T06D04 – (6.2b) Maxwell-Boltzmann and Catalysts

Name …….

1. 6.2.5 Sketch and explain qualitatively the Maxwell–Boltzmann energy distribution curve for a fixed amount of gas at different temperatures and its consequences for changes in reaction rate. (3)
   a. What is the Maxwell-Boltzmann Distribution?

   b. Draw an example of a Maxwell-Boltzmann distribution for a graph with temperatures of 100K, 300K, 600K, 1000K. (This is just an example, not for a specific process)

   c. What does the area under the curve at any given point represent?

   d. How does temperature effect the Maxwell-Boltzmann Distribution curve? Fill out the following table:

Increase in Temperature causes an impact on:	Effect
The peak of the curve	
The pitch of the curve	
The area under the curve to the right of the E_a	

   e. Once again, what effect does a temperature change have on the rate, fill in the following table:

Result of Temp Increase	Effect
Speeds of the particles, more distance in given time	
Total energy of the particles is increased	

2. 6.2.6 Describe the effect of a catalyst on a chemical reaction. (2)
3. 6.2.7 Sketch and explain Maxwell– Boltzmann curves for reactions with and without catalysts. (3)
   a. What is a catalyst?

   b. What does a catalyst do to a reaction, how?

   c. Provide an energy diagram for an endo and exothermic process for which catalyst is added:

Endothermic with catalyst	Exothermic with catalyst

d. Let's clear up some misconceptions. What does a catalyst not do?
   i.
   ii.
   iii.
   iv.

e. What are biological catalysts known as?

f. What does an inhibitor do? (you will see this again when we get to biochemistry, competitive and non-competitive inhibitors).
   i. An example is:

g. In chemical industry
   i. Finely divided iron is used to…
   ii. A complex organo-metallic catalysts… (you will see this in organic chem)
   iii. Solid Manganese (IV) oxide (manganese dioxide)…

h. Oxidation of potassium sodium tartrate by hydrogen peroxide, catalyzed by $CoCl_2$ (we'll try this in class as a demo☺)

i. Explain the difference between the following catalysts:

Catalyst	Explanation/Definition/Example
Heterogeneous Catalyst	
Homogeneous Catalyst	
Autocatalysis	